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(54) Title: FIXATION PLATE <div style="text-align: center;"> </div> (57) Abstract <p>The present invention relates to a fixation plate for fixing objects in a flexurally rigid manner in a longitudinal direction of the plate, while allowing a certain degree of bending in the other direction and a certain degree of torsion along the diagonals of the plate. According to the invention, the plate (1) is made of an elastic material, and a plurality of closed cavities (2) are formed in the plate in the flexurally rigid longitudinal direction thereof. Inelastic rods (3) which are deformable to the contour of the object or objects are provided in the cavities (2).</p>		

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FIXATION PLATE

The present invention relates to a fixation plate for fixing objects in a flexurally rigid manner in a longitudinal direction of the plate, while allowing a certain degree of bending in the other direction and a certain degree of torsion along the diagonals of the plate.

In the case of e.g. a rib fracture, use has hitherto been made of a splint or supporting bandage or such like which is wound around the chest to immobilise the ribs. The mobility of the chest is then limited and natural breathing made more difficult since the chest is not free to expand. Therefore, the pressure exerted on the ribs may cause severe pain to the patient. Since the ribs will move despite the splint and this movement is not the natural one but an enforced movement, the healing process will also be considerably prolonged.

The object of the present invention thus is to provide a fixation plate of the type stated in the introduction to this specification, which is used for supporting and fixing e.g. fractured ribs, but which at the same time also allows the ribs to move and follow the natural motion of the chest during breathing. This object is achieved by a fixation plate having the features stated in the claims.

The invention will now be described in more detail in a preferred embodiment with reference to the accompanying drawing, in which:

Fig. 1 is a section of a fixation plate in accordance with the invention;

Fig. 2 is a transverse section of the fixation plate according to Fig. 1; and

Fig. 3, which is a section similar to that of Fig. 2, shows an alternative embodiment of the fixation plate according to the invention.

Referring now to Figs. 1 and 2, the fixation plate according to the invention comprises a plate 1 of an elastic material, such as rubber or plastic. A plurality of closed cavities 2 are formed in the plate 1 and extend in the flexurally rigid longitudinal direction of the plate. A rod 3 is provided in each cavity 2. The rods 3 are made of an inelastic but deformable material and have such dimensions relative to the cavities that each rod is enclosed with play in the respective cavity and is freely movable therein, i.e. such that the rods are in no way fixed to the cavity walls. If the fixation plate should be used for fixing fractured ribs, perforations 4 may also be provided in the plate 1.

Fig. 3 shows an alternative embodiment of the fixation plate. In this embodiment, the cavities are defined by tubes 5 or the like which are embedded in the plate 1 by moulding. Otherwise, this embodiment agrees with the embodiment in Figs. 1 and 2.

For attaching the plate 1 to the object or objects to be immobilised, one side of the plate may be provided with an adhesive layer 6 or the like, as shown in Figs. 2 and 3. When the fixation plate should be used for fixing rib fractures, the adhesive layer 6 is a tape which is kind to the skin.

When using the fixation plate, the rods 3 are first deformed to follow the contour of the object or objects to be fixed in the direction intended to be flexurally rigid. In the case of a rib fracture, this thus means the direction of the ribs. The plate 1 is thereafter attached to the object or objects, e.g. by means of the adhesive layer 6. Since the rods 3 are freely movable with play in the cavities 2 of the plate, this can be bent to a certain extent in the non-flexurally rigid direction and also be twisted to a certain extent along the diagonals, yet ensuring sufficient flexural rigidity in the longitudinal direc-

tion of the rods. In the case of a rib fracture, this means that the ribs are firmly fixed in their longitudinal direction while the chest remains free to expand normally during breathing. The healing process thus
5 is essentially accelerated without causing any pain to the patient.

Although the invention has been described above with particular reference to the fixation of fractured ribs, it is understood that the invention can also
10 be used in other cases for fixing objects where flexural rigidity is required in one direction, but where a certain mobility in the other direction or a certain torsional capacity is desired. Further, if the material in the plate so allows, the rods need not be free-
15 ly movable with play, but may be embedded directly in the plate by moulding. In this case, the cavities thus are completely filled by the respective rod.

The invention is not restricted to this field of use but may also be applied in other contexts and be
20 modified within the scope of the accompanying claims.

CLAIMS

1. Fixation plate for fixing objects in a flexurally rigid manner in a longitudinal direction of the plate, while allowing a certain degree of bending in the other direction and a certain degree of torsion along the diagonals of the plate, characterised in that the plate (1) is made of an elastic material, that a plurality of closed cavities (2) are formed in the plate in the flexurally rigid longitudinal direction thereof, and that inelastic rods (3) deformable to the contour of the object or objects are provided in said cavities.

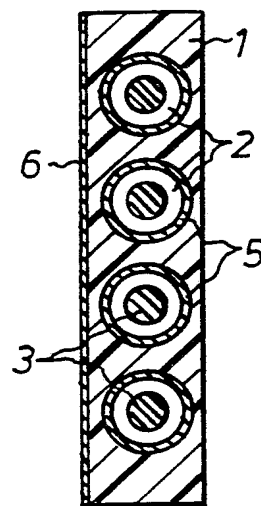
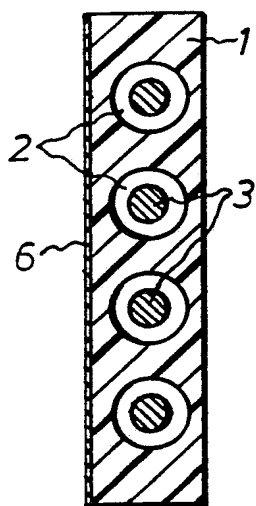
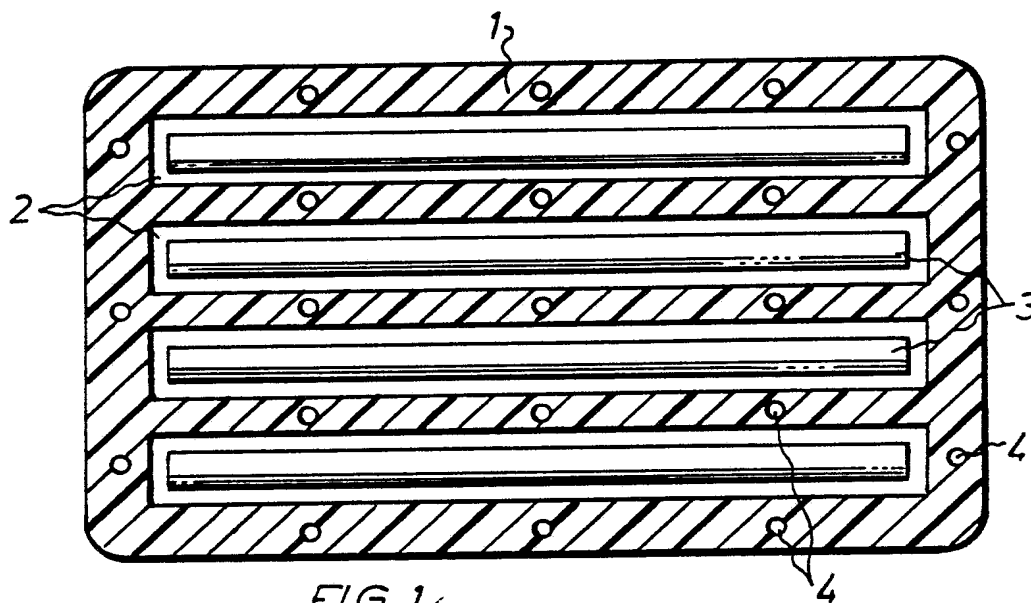
2. Plate as claimed in claim 1, characterised in that the rods (3) are freely movable with play in the cavities (2).

3. Plate as claimed in claim 2, characterised in that the cavities (2) are provided by elastic tubes (5) embedded in the plate (1) by moulding.

4. Plate as claimed in any one of the preceding claims, characterised in that the plate (1) is provided on one side with an adhesive layer (6) for attaching the plate to the object or objects.

5. Plate as claimed in any one of the preceding claims, characterised in that it is provided with perforations (4) between and outside the cavities (2).

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INTERNATIONAL SEARCH REPORT

International Application No. PCT/SE88/00700

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
A 61 F 13/04		
II. FIELDS SEARCHED		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC 4 A 61 F; A 61 L		
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched *		
SE, NO, DK, FI classes as above..		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
A	US, A, 3 110 307 (T.E. HAMILTON) 12 November 1963	1-5
A	US, A, 1 070 869 (F.K. ALEXANDER) 19 August 1913	1-5
A	SE, C, 141 899 (G.V.I. HULTGREN) 1 September 1953	1-5
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Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1989-03-08	1989 -03- 08	
International Searching Authority	Signature of Authorized Officer	
Swedish Patent Office	Hans Christer Jönsson	